## REMARKS

This responds to the Office Action mailed on June 9, 2005. By this response, claims 18, 26, 31, 34, 42 and 55 have been amended, and claims 58 and 59 were added. No claims were canceled. As a result, claims 18-59 are now pending in this application. Reconsideration of this application in view of the above amendments and the following remarks is requested.

### *Claim Objections*

**Objection:** Claim 31 was objected to because of the following informality: claim 31 depends from cancelled claim 12. The Examiner indicated that appropriate correction was required.

**Response to Objection:** Claim 31 has been amended to depend from claim 18 rather than from claim 12. The dependency on claim 12 was a typographical error and is now corrected.

### *§112 Rejection of the Claims*

**A. Rejection under 35 USC § 112:** Claim 27 was rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

**B. Response to 35 USC § 112 Rejection:** Claim 26 has been amended to recite "...initially drawing a vacuum on the space between the die and the thermally conductive heat spreader to substantially remove a first gas..." Therefore, claim 26 now recites a first gas. There is now proper antecedent basis for "the first gas" recitation in Claim 27 since claim 27 depends from claim 26.

**C. Rejection under 35 USC § 112:** Claim 55 was rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

**D. Response to 35 USC § 112 Rejection:** Claim 55 now recites "...isolating a plurality of electrical contacts between the die and the substrate to which the die is attached from the molten metal..." Applicant submits that claim 55, as amended, now distinctly claims the subject matter that applicant regards as the invention.

*§102 Rejection of the Claims*

**A. Rejection under 35 USC § 102:** Claims 34, 37-38, and 41 were rejected under 35 USC § 102(b) as being anticipated by IBM Technical Disclosure Bulletin (TDB) (NN79034125).

**B. Response to 35 USC § 102 Rejection:** Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. *In re Dillon* 919 F.2d 688, 16 USPQ 2d 1897, 1908 (Fed. Cir. 1990) (en banc), cert. denied, 500 U.S. 904 (1991). It is not enough, however, that the prior art reference discloses all the claimed elements in isolation. Rather, "[a]nticipation requires the presence in a single prior reference disclosure of each and every element of the claimed invention, *arranged as in the claim.*" *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983)) (emphasis added).

Claim 34, as amended, recites "...interposing a molten metal material between the thermally conductive heat spreader and the die, the molten metal material substantially filling a gap between the die and the thermally conductive heat spreader." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) teaches a liquid filled bellows that serves as a heat sink. The bellows and liquid therein does not substantially fill the space between the heat spreader and the die. Open space exists between the aluminum can 16 and the bellows as well as between the heat sink and the die or electronic device. The IBM TDB (NN79034125) does not anticipate claim 34 since the IBM TDB fails to disclose of each and every element of the claimed invention, much less each and every element arranged as in the claim. Accordingly, claim 34 overcomes the Examiner's rejection under 35 USC § 102(b) as being anticipated by IBM Technical Disclosure Bulletin (TDB) (NN79034125).

Claims 37-38, and 41 depend from claim 34 in this application. As a result, claims 37-38, and 41 also overcome the Examiner's rejection under 35 USC § 102(b) as being anticipated by IBM Technical Disclosure Bulletin (TDB) (NN79034125).

*§103 Rejection of the Claims*

**A. Rejection under 35 USC § 103:** Claims 18-20, 22-24, 33, 42-44, and 46-55 were rejected under 35 USC § 103(a) as being unpatentable over IBM Technical Disclosure Bulletin (TDB) (NN79034125) in view of Huang et al. (2002/0180035).

**B. Response to 35 USC § 103 Rejection:** In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference or references must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991)).

Claim 18 recites "...flowing a molten metal material into contact with the thermally conductive heat spreader and the die to substantially fill a space between the thermally conductive heat spreader and the die with the metal material." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. The Huang et al. (2002/0180035) reference also fails to to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125) and the Huang et al. (2002/0180035) reference falls short of the invention as recited in claim 18. Therefore, a proper prima facie case of obviousness is not made since , the prior art references fail to teach or suggest all the claim limitations.

In addition, Applicant submits that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. In fact, if the IBM Technical Disclosure Bulletin (TDB) (NN79034125) was modified to substantially fill a space between the thermally conductive heat spreader and the die with the metal material it would destroy an aspect of the invention. The bellows provides "...a flexible connection between the heat silicon device and the copper heat sink 10 which can expand and compress with temperature changes." If the space between the die and the conductive heat spreader were substantially filled, there would be no room for expansion of the copper heat sink. The destruction of an aspect of the invention is evidence against a reason or motivation to combine the references. As a result, the rejection of claim 18 under 35 USC § 103(a) as being unpatentable over IBM Technical Disclosure Bulletin (TDB) (NN79034125) in view of Huang et al. (2002/0180035) is now overcome.

Claims 20, 22-24 and 33, depend from claim 18 in this application. Therefore, the recitations of claim 18 are included in claims 20, 22-24 and 33. Since all the elements of claims 18 and 20, 22-24 and 33 are not taught by the combination of the IBM TDB and the Huang et al. reference, and since the combination would destroy an aspect of the IBM invention, the rejection of claims 20, 22-24 and 33 under 35 USC § 103(a) as being unpatentable over IBM Technical Disclosure Bulletin (TDB) (NN79034125) in view of Huang et al. (2002/0180035) is also overcome.

Claims 42 recites "...flowing a molten metal material into contact with the heat spreader and the die to substantially fill a gap between the heat spreader and the die." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. The Huang et al. (2002/0180035) reference also fails to to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125) and the Huang et al. (2002/0180035) reference falls short of the invention as recited in claim 42. Therefore, a proper prima facie case of obviousness is not made since , the prior art references fail to teach or suggest all the claim limitations. In addition, modifying the IBM Technical Disclosure Bulletin (TDB) (NN79034125) to meet this recitation would

destroy an aspect of this invention; namely, to destroy the flexible connection that allows the copper heat sink to expand and compress with temperature. This destruction of at least one aspect of the invention found in the IBM Technical Disclosure Bulletin (TDB) (NN79034125) is evidence against a reason or motivation to combine the references. As a result, the rejection of claim 42 under 35 USC § 103(a) as being unpatentable over IBM Technical Disclosure Bulletin (TDB) (NN79034125) in view of Huang et al. (2002/0180035) is now overcome.

In addition, claims 43-44, and 46-55 depend from claim 42, and include the recitations of claim 42 by their dependency. As a result, claims 43-44, and 46-55 now also overcome the Examiner's rejection under 35 USC § 103(a) as being unpatentable over IBM Technical Disclosure Bulletin (TDB) (NN79034125) in view of Huang et al. (2002/0180035).

**C. Rejection under 35 USC § 103:** Claims 35-36 are rejected under 35 USC § 103(a) as being unpatentable over TDB '125 as applied to claim 34 above, and further in view of Satoh et al. (5,276,289).

**D. Response to 35 USC § 103 Rejection:** Claims 35-36 depend from claim 34 and include the limitations of claim 34 by their dependency. Claim 34 as amended, recites "...interposing a molten metal material between the thermally conductive heat spreader and the die, the molten metal material substantially filling a gap between the die and the thermally conductive heat spreader." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. The Satoh et al. (5,276,289) reference also fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125) and the Satoh et al. (5,276,289) reference falls short of the invention as recited in claims 35-36. Therefore, a proper *prima facie* case of obviousness is not made since, the prior art references fail to teach or suggest all the claim limitations. As a result, the rejection of claims 35-36 under 35 USC § 103(a) as being unpatentable over TDB '125 as applied to claim 34 above, and further in view of Satoh et al. (5,276,289) is now overcome.

**E. Rejection under 35 USC § 103:** Claim 39 was rejected under 35 USC § 103(a) as being unpatentable over TDB '125 as applied to claim 34 above, and further in view of Huang et al. (2002/0180035).

**F. Response to 35 USC § 103 Rejection:** Claim 39 depends from claim 34 and includes the limitations of claim 34 by its dependency. Claim 34, as amended, recites "...interposing a molten metal material between the thermally conductive heat spreader and the die, the molten metal material substantially filling a gap between the die and the thermally conductive heat spreader." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. The Huang et al. (2002/0180035) reference also fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125) and the Huang et al. (2002/0180035) reference falls short of the invention as recited in claim 39. Therefore, a proper *prima facie* case of obviousness is not made since, the prior art references fail to teach or suggest all the claim limitations. In addition, modifying the IBM Technical Disclosure Bulletin (TDB) (NN79034125) to meet this recitation would destroy an aspect of this invention; namely, to destroy the flexible connection that allows the copper heat sink to expand and compress with temperature. This destruction of at least one aspect of the invention found in the IBM Technical Disclosure Bulletin (TDB) (NN79034125) is evidence against a reason or motivation to combine the references. As a result, the rejection of claim 34 under 35 USC § 103(a) as being unpatentable over IBM Technical Disclosure Bulletin (TDB) (NN79034125) in view of Huang et al. (2002/0180035) is now overcome.

**G. Rejection under 35 USC § 103:** Claim 40 was rejected under 35 USC § 103(a) as being unpatentable over TDB '125 as applied to claim 34 above, and further in view of Werkhoven et al. (2003/0129826).

**H. Response to 35 USC § 103 Rejection:** Claim 40 depends from claim 34 and includes the limitations of claim 34 by its dependency. Claim 34, as amended, recites "...interposing a molten metal material between the thermally conductive heat spreader and the die, the molten metal material substantially filling a gap between the die and the thermally conductive heat spreader." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. The Werkhoven et al. (2003/0129826) reference also fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125) and the Werkhoven et al. (2003/0129826) reference falls short of the invention as recited in claim 40. Therefore, a proper *prima facie* case of obviousness is not made since, the prior art references fail to teach or suggest all the claim limitations. As a result, the rejection of claim 40 under 35 USC § 103(a) as being unpatentable over TDB '125 as applied to claim 34 above, and further in view of Werkhoven et al. (2003/0129826) is now overcome.

**I. Rejection under 35 USC § 103:** Claims 31-32 and 56-57 were rejected under 35 USC § 103(a) as being unpatentable over TDB '553 in view of Huang as applied to claims 18, 42, and 52 above, and further in view of Satoh et al. (U.S. 5,276,289).

**J. Response to 35 USC § 103 Rejection:** Claims 31-32 depend from claim 18 and include the limitations of that claim by their dependency. Claim 18 recites "..."...flowing a molten metal material into contact with the thermally conductive heat spreader and the die to substantially fill a space between the thermally conductive heat spreader and the die with the metal material." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. The Huang et al. (2002/0180035) reference and the Satoh et al. (U.S. 5,276,289) reference also fails to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB)

(NN79034125), Huang et al. (2002/0180035), and the Satoh et al. (U.S. 5,276,289) reference falls short of the invention as recited in claim 18 and claims 31-32. Therefore, a proper *prima facie* case of obviousness is not made since, the prior art references fail to teach or suggest all the claim limitations.

Claims 56-57 depend from claim 42 and include the limitations of that claim by their dependency. Claim 42 recites "...flowing a molten metal material into contact with the heat spreader and the die to substantially fill a gap between the heat spreader and the die." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. The Satoh et al. (U.S. 5,276,289) reference also fails to teach or suggest the requirement to substantially fill a gap between the thermally conductive heat spreader and the die with the metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125) and the Satoh et al. (U.S. 5,276,289) reference falls short of the invention as recited in claim 42, as well as the invention recited in claims 56-57. Therefore, a proper *prima facie* case of obviousness is not made since , the prior art references fail to teach or suggest all the claim limitations.

**K. Rejection under 35 USC § 103:** Claims 25 and 30 were rejected under 35 USC § 103(a) as being unpatentable over TDB '553 in view of Huang as applied to claims 18 above, and further in view of Tonti et al. (U.S. 5,773,362).

**L. Response to 35 USC § 103 Rejection:** Claims 25 and 30 depend from claim 18 and include the limitations of claim 18 by their dependency. Claim 18 recites "..."...flowing a molten metal material into contact with the thermally conductive heat spreader and the die to substantially fill a space between the thermally conductive heat spreader and the die with the metal material." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. The Huang et al. (2002/0180035) reference and the Tonti et al. (U.S. 5,773,362) reference also fail to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the

metal material. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125), Huang et al. (2002/0180035), and the Tonti et al. (U.S. 5,773,362) reference falls short of the invention as recited in claim 18 and claims 25 and 30. Therefore, a proper *prima facie* case of obviousness is not made since, the prior art references fail to teach or suggest all the claim limitations.

**M. Rejection under 35 USC § 103:** Claims 26-29 were rejected under 35 USC § 103(a) as being unpatentable over TDB '553, Huang, and Tonti as applied to claims 18 and 25 above, and further in view of Weaver et al. (U.S. 2002/0096508).

**N. Response to 35 USC § 103 Rejection:** Claims 26-29 depend from claim 18 and include the limitations of claim 18 by their dependency. Claim 18 recites "..."...flowing a molten metal material into contact with the thermally conductive heat spreader and the die to substantially fill a space between the thermally conductive heat spreader and the die with the metal material." The IBM Technical Disclosure Bulletin (TDB) (NN79034125) fails to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. The Huang et al. (2002/0180035) reference and the Tonti et al. (U.S. 5,773,362) reference also fail to teach or suggest the requirement to substantially fill a space between the thermally conductive heat spreader and the die with the metal material. The Weaver et al. (U.S. 2002/0096508) also fails to fill the gap. Therefore, the combination of the IBM Technical Disclosure Bulletin (TDB) (NN79034125), Huang et al. (2002/0180035), Tonti et al. (U.S. 5,773,362), and Weaver et al. (U.S. 2002/0096508) falls short of the invention as recited in claim 18 and claims 25 and 30. Therefore, a proper *prima facie* case of obviousness is not made since, the prior art references fail to teach or suggest all the claim limitations.

*Allowable Subject Matter*

Claims 21 and 45 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. New claims 58 and 59 correspond to claims 21 and 45, respectively, as amended to allowable form.

*Conclusion*

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney ((612) 373-6977) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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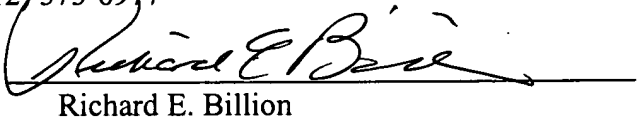
Date 9/19/05

By 
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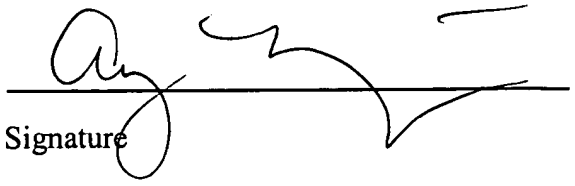
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## IN THE DRAWINGS

Formal Drawings are enclosed herewith.